

Large On-Site Wastewater Treatment and Disposal  
Systems  
Spray Irrigation Operation Permit  
Application

Applicant: Artesian Wastewater Management, Inc.

Facility: Artesian Northern Sussex Regional Water Recharge Facility (ANSRWRF)

Public Hearing  
August 21, 2019 - 6:00PM

Groundwater Discharges Section, Division of Water  
Delaware Department of Natural Resources and Environmental Control



# Overview

- **Artesian Wastewater Management, Inc.**, has applied for a spray irrigation operations permit to receive treated wastewater effluent from Allen Harim WTP for storage, in a synthetically lined lagoon, and disposal, via spray irrigation at the ANSRWRF.
- The design average daily flow is 1.5 MGD with a peak flow of 2.0 MGD.



# Overview

- The facility will utilize reclaimed wastewater for irrigation of privately owned agricultural land under a lease held in perpetuity by Artesian.
- The proposed irrigation sites (including current and future phases) total approximately 1,714 acres of land which includes both wooded and agricultural area.
  - Current permit for allows spray on Fields F & G only until completion of a Schedule of Compliance for Fields D & E construction completion.
- These sites have been permanently placed in an Agricultural Preservation Easement by the Delaware Agricultural Lands Preservation Foundation.



# Overview

- The effluent will receive a high level of treatment to meet the “Unlimited Public Access” requirement at the Allen Harim Wastewater Treatment Plant.
- Nitrogen polishing will be accomplished through crop uptake to meet Regulatory requirements.
- The Artesian facility is also capable of disinfecting the stored wastewater if additional treatment is required prior to spray irrigation.



# ANSRWRF – Site Map



## Legend

-  Monitoring Wells
-  Piezometers
-  Lysimeters
-  Surface Water Monitoring Locations



# Regulatory Requirements

- Unlimited public access
- All wastewater used for irrigation on unlimited access sites must be biologically treated, filtered and disinfected.
- The treated wastewater must meet the following daily permissible average concentrations:

<b>Parameter</b>	<b>Daily Permissible Average Concentration</b>
BOD <sub>5</sub>	10 mg/L
Fecal Coliform	20 colonies/100 mL
Total Suspended Solids	10 mg/L
Turbidity	5 NTU



# Regulatory Requirements

- Facility is required to achieve an average annual concentration of 10 mg/L in the percolate beneath all spray fields as verified by in-field monitoring.
- Percolate total nitrogen concentration must be estimated in a monthly nitrogen balance spreadsheet which considers:
  - Average design wastewater loading
  - Nitrogen concentration in the effluent
  - Average annual precipitation and fixation
  - Application of all fertilizers
  - Propose crop cover and cover crop management scheme (i.e. crop uptake)
- The design effluent total nitrogen concentration for a facility determines the spray system design factors that will result in 10mg/L in the percolate (i.e. number of acres, application rate, type of crop, fertilizer usage, etc...)



# DRAFT Operation Permit Limitations

- Design Effluent Nitrogen Concentration:
  - The facility has been designed for an effluent Total Nitrogen (TN) concentration of 30 mg/L
    - TN > [Design Value + 25%] in this case 37.5 mg/L requires resampling and submission of data to GWDS.
    - TN > 37.5 mg/L for over 3 months requires root cause analysis and submission of a revised Design Engineering Report.
    - TN > [Design Value + 50%] in this case 45 mg/L may result in permit revocation if corrective measures/redesign is not performed.
- Nitrogen Loading Limitation:

The total amount of nitrogen that may be applied to each spray field acre shall not exceed the following.

Crop Type	Nitrogen Loading Limit (lbs/acre-year)
Cover – Corn - Barley	334.5
Barley – Soybean – Cover	388.8
Woods (Loblolly Pines)	435.4



# DRAFT Operation Permit Limitations

- Effluent Volume Limitation:

Field	Crop Type	Maximum Annual Volume (MG)	Acres
Field D <sup>1</sup> Crop without D4	Cover-Corn-Wheat	61.7	54.02
Field D <sup>1</sup> Crop without D4	Wheat-Soybean-Cover	75.6	54.02
Field D <sup>1</sup> Crop with D4	Cover-Corn-Wheat	66.2	58.03
Field D <sup>1</sup> Crop with D4	Wheat-Soybean-Cover	81.2	58.03
Field D <sup>1</sup> Woods	Loblolly Pine Woods	56.8	32.69
Field E Crop	Cover-Corn-Wheat	103.3	90.48
Field E Crop	Wheat-Soybean-Cover	126.6	90.48
Field F Crop	Cover-Corn-Wheat	126.1	110.48
Field F Crop	Wheat-Soy-Cover	154.5	110.48
Field G Crop	Cover-Corn-Wheat	315.1	276.06
Field G Crop	Wheat-Soy-Cover	386.1	276.06
Field G Woods	Loblolly Pines	348.6	200.47



# Storage Design Criteria

- Storage provided in design
  - Normal operations only requires 65.2 MG of storage
  - 90 MG capacity provided
  - Excess capacity intended for Phase II expansion
  - Excess capacity can be utilized in case of emergency
  - Field G alone provides sufficient acreage, 471 acres, to eliminate the average daily design flow and the total storage volume within a 90 day period via irrigation.



# Design Application Rate

- ANSRWRF spray irrigation disposal system was designed at a conservative maximum disposal rate of 1.65 inches per week.
- The On-Site Regulations allow up to 2.5 inches per acre per week; and, exceedance of 2.5 with written permission from the Department.
- If necessary, the operators may seek temporary permission to exceed the design spray limit of 1.65 inches per week provided groundwater levels are not excessive and nitrogen balance calculations allow.



# DRAFT Operation Permit Requirements

## Effluent Monitoring Required at ANSRWRF

<b>Parameter</b>	<b>Unit Measurement</b>	<b>Monitoring Frequency</b>	<b>Sample Type</b>
Ammonia Nitrogen	mg/L	Monthly	Composite
Cadmium	mg/L	Annually	Composite
Copper	mg/L	Annually	Composite
Effluent Flow	Gal/day per Field/Zone/Pivot	Continuous	Recorded
Fecal Coliform	Col/100 ml	Twice per month	Grab
Lead	mg/L	Annually	Composite
Nickel	mg/L	Annually	Composite
Nitrate + Nitrite Nitrogen	mg/L	Monthly	Composite
Organic Nitrogen	mg/L	Monthly	Calculation
Total Nitrogen	mg/L	Twice per Month	Composite
Zinc	mg/L	Annually	Composite



# O&M Plan Emergency and Contingency Planning

- An extra 15 days of storage at Phase 1 flow rates in the storage lagoon and an additional 3 feet of freeboard that can be utilized in emergency conditions.
- Diversion off offspec at the Allen Harim facility.
- If offspec did reach ANSRWRF:
  - Spray operations will be temporarily suspended,
  - Additional monitoring will be performed at the lagoon, and
  - If necessary, additional chlorination or portable treatment will be used to bring effluent back to compliance prior to spray irrigation.



# O&M Plan Emergency and Contingency Planning

- The Phase 1 construction permit includes more than the minimum required land for spray disposal of the design flow rate.
- These 110 additional acres are available to provide flexibility in operations.
- If challenging conditions arise, additional Fields D & E can be brought into operational use.



# Conclusion:

To access this powerpoint and all hearing exhibits, please visit:

<https://dnrec.alpha.delaware.gov/events/473/public-hearing-allen-harim-wastewater-treatment-system-and-artesian-spray-irrigation-permit/>

# Thank You!

